



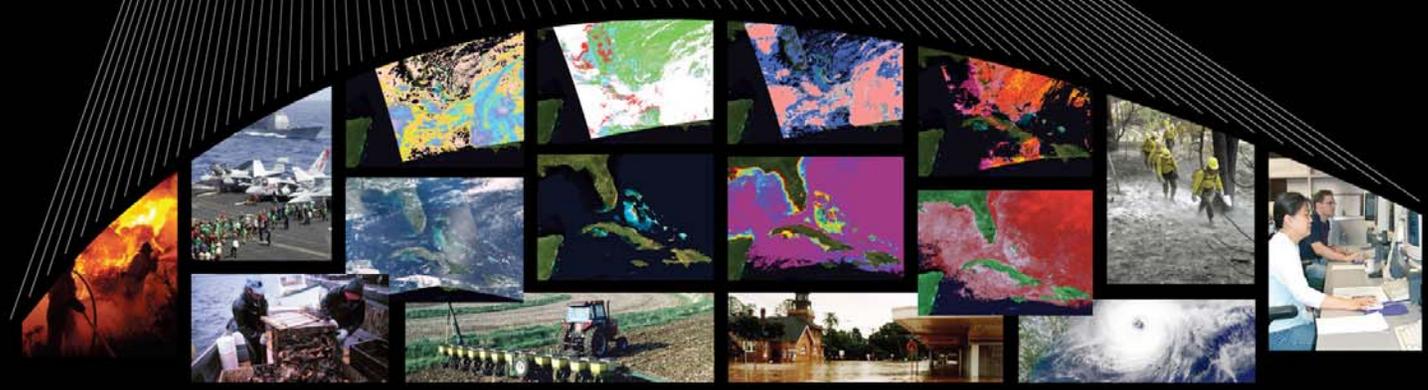
Patrick Coronado - DRL

# direct readout

*developing technologies for **real-time** collection, processing, and distribution of Earth science data*

The Direct Readout Laboratory (DRL) at NASA's Goddard Space Flight Center develops technologies to maximize the utility of Earth science data for real-time decision-making.

- The DRL serves as the bridge between user needs and mission objectives.
- The DRL's technology development process stresses continuity and standardization.
- DRL technologies enable instant access to instrument data and derivative products from the Aqua and Terra missions and, in the future, the NPP and NPOESS missions.
- DRL technologies are designed to be scalable, extensible, portable and easy to use.





# Driving Force Behind DRL Technology Development



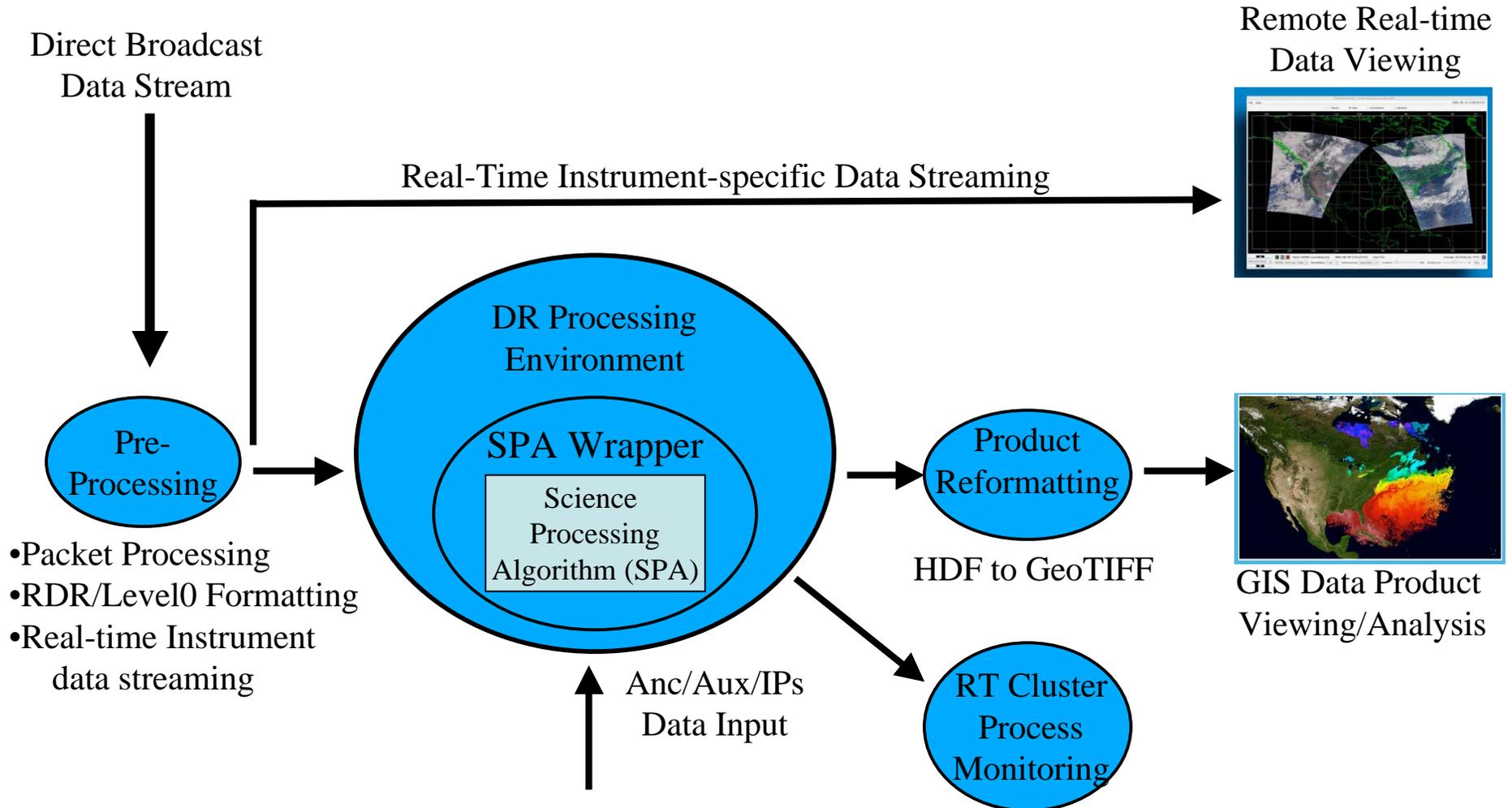
- Utility and transportability of Earth science data
- Modularity, scalability, portability & extensibility of DR Tools
- Real-time data processing tools
- Utility via the promotion of standards in pre processing sub-systems, SPAs interfaces, visualization and real-time processing systems



# NPP In-Situ Ground System (NISGS)

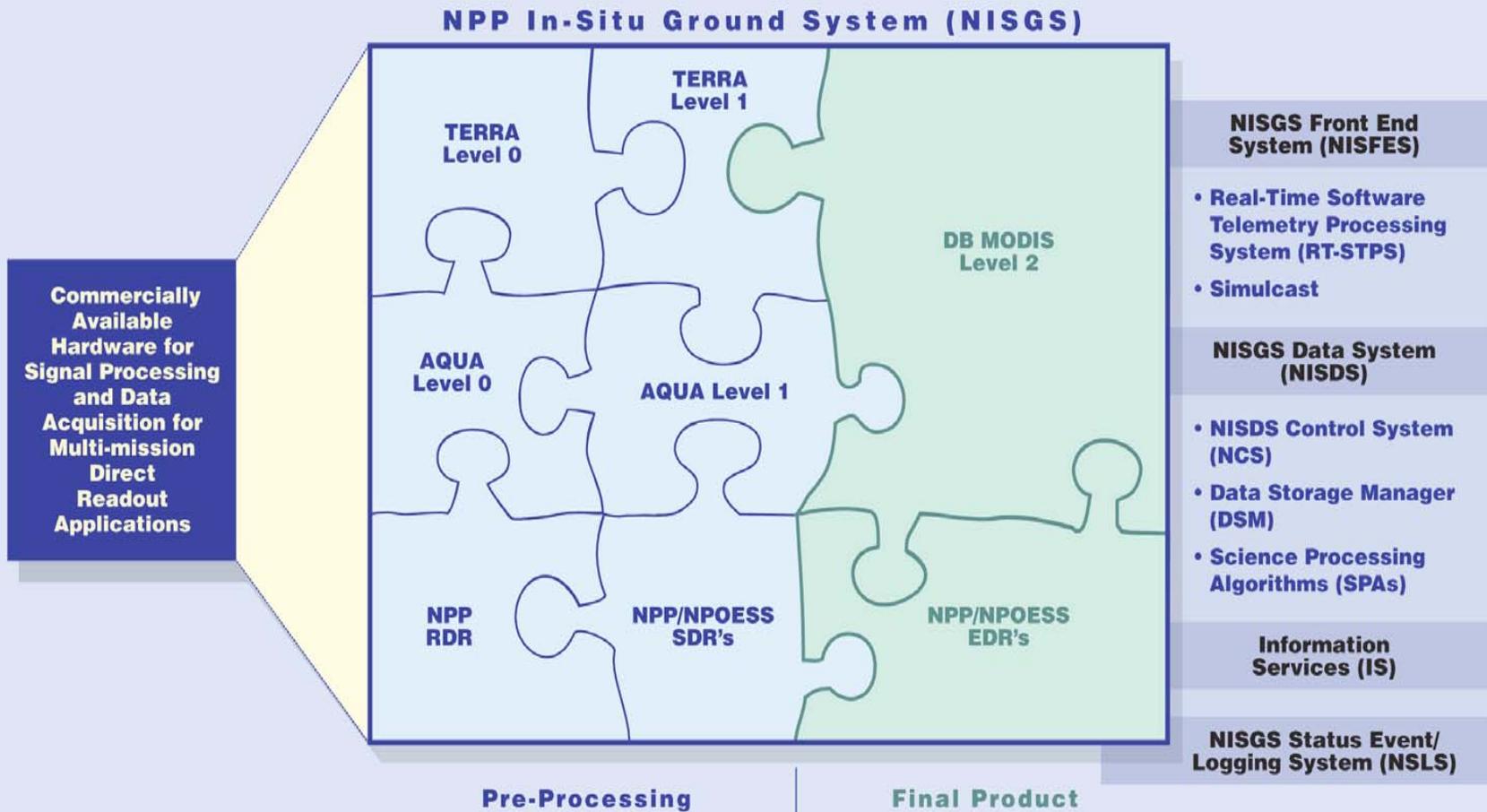


## Build 3 – Legacy Missions





# Modular Components Approach for *Real-Time* Data System Implementation

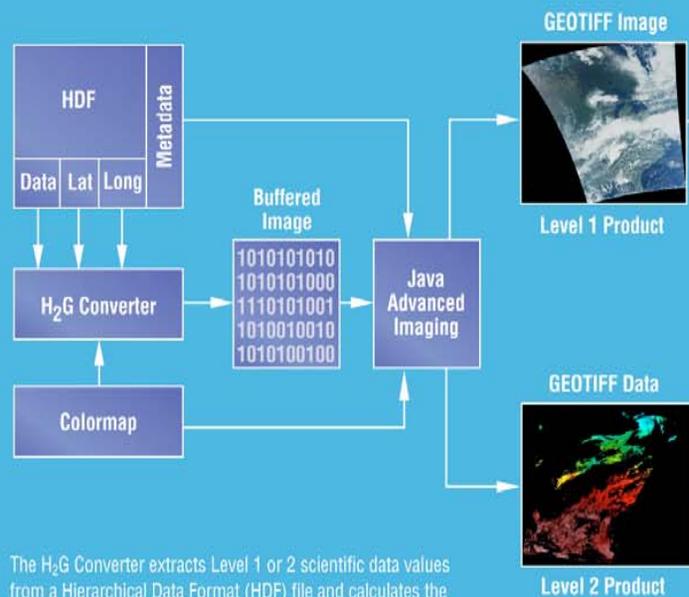




# HDF to GEOTIFF (H<sub>2</sub>G) Converter

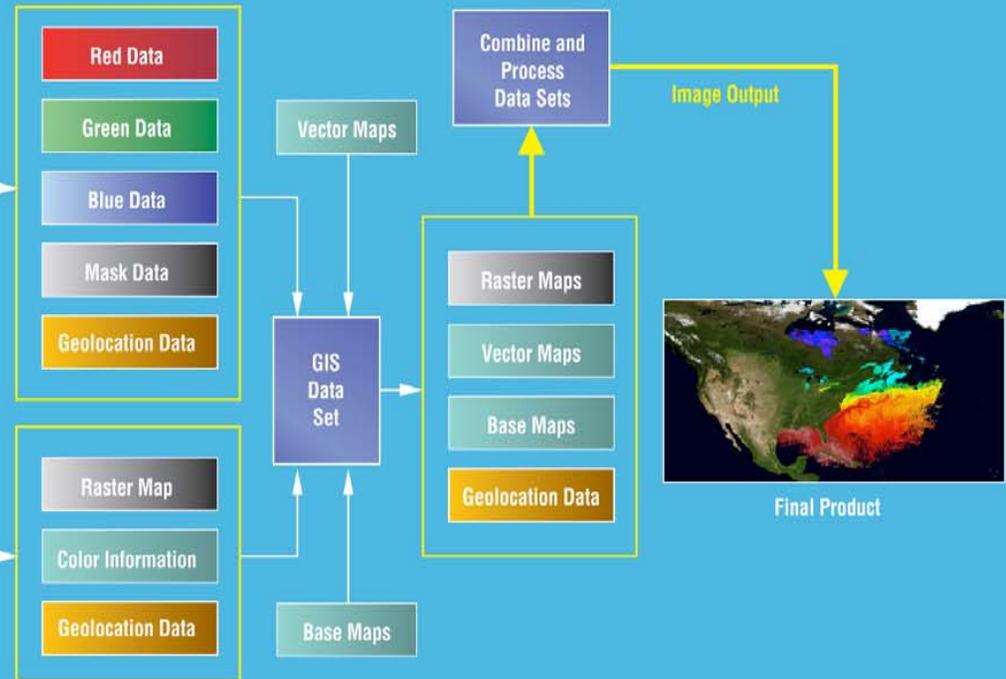
## A Tool for Enhancing the Utility of Earth Science Data

### THE H<sub>2</sub>G TOOL



The H<sub>2</sub>G Converter extracts Level 1 or 2 scientific data values from a Hierarchical Data Format (HDF) file and calculates the corresponding index on a colormap. H<sub>2</sub>G then uses the geolocation data from the HDF file to locate the indices on an internal image buffer. This internal image buffer, the colormap, and metadata extracted from the HDF are input to the Java Advanced Imaging (JAI) package to produce a corresponding Georeferenced Tagged Image File Format (GEOTIFF) file.

### GIS PRODUCT FLOW



GEOTIFF data products, which are created from the "science algorithm" HDF output via the H<sub>2</sub>G tool, are imported to create a native Geographic Information System (GIS) data set. The GIS data set is then processed and combined into a finished data product for visualization and analysis.



# Science Processing Algorithm (SPA) Wrapper

## SPA Wrapper Process

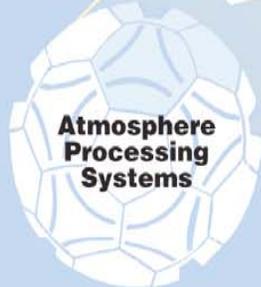
1. Varied Requirements
2. Assimilation
3. Standardization



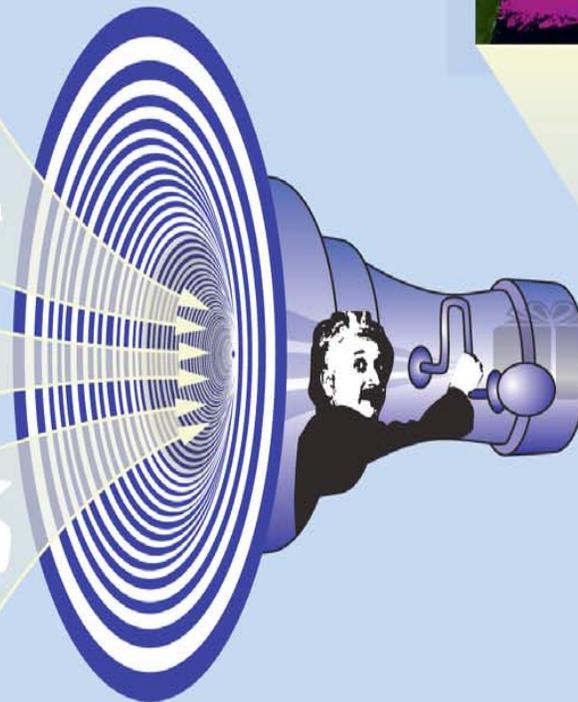
Land Processing Systems



Ocean Processing Systems



Atmosphere Processing Systems



Standalone Wrapped Algorithms



End User Options  
- Freedom of Choice -





# DR Tool Development and Algorithms - FY06 Results -



<i>Supported by</i>	<u>Tool/Algorithm</u>	<u>Status</u>
<i>NPP/DRP</i>	<ul style="list-style-type: none"><li>• <b>Real-Time Software Telemetry Processing System (RT-STPS)</b></li></ul>	<b>Released new version which adds additional operating system independence</b>
<i>DRP/NPP</i>	<ul style="list-style-type: none"><li>• <b>Ground-Based Attitude Determination (GBAD) module</b></li></ul>	<b>Have released a new version with syntax enhancements that previously inhibited compilation using the GCC 3.4.4 Compiler, and includes modifications for execution on both 32-bit and 64-bit Intel-compatible machines</b>
<i>NPP/DRP</i>	<ul style="list-style-type: none"><li>• <b>Simulcast</b></li></ul>	<b>Have released a new version with added Real-time geolocation, partial calibration and orbit predicts with Mercator and Polar map projections for MODIS data</b>
<i>DRP</i>	<ul style="list-style-type: none"><li>• <b>Multi-Mission Scheduler and Dispatcher</b></li></ul>	<b>Completed alpha version and have begun evaluation</b>



# DB Tool Development and Algorithms - FY06 Results - (cont.)



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<u>Supported By:</u>	<u>Tool/Algorithm</u>	<u>Status</u>
<i>NPP/DRP</i> •	Standalone EOS Level-1 and select Level-2 algorithms. NPP SDR and Select EDR algorithms.	Have repackaged the consolidated 10 MODIS DB algorithm for using the SPA wrapper.
<i>NPP/DRP</i> •	<b>NISGS Data System Infrastructure</b> <ul style="list-style-type: none"><li>- NISGS Control System (NCS)</li><li>- Information Services (IS)</li><li>- Data Storage Manager (DSM)</li><li>- NISGS Status/Event Logging System (NSLS)</li></ul>	Have completed Build 3.0 and placed all components in pseudo-operations. All products generated are being placed on-line via this NISGS framework. Have begun providing access to anc/aux data and real-time DB data via the IS sub-system.
<i>DRP</i> •	EOS Instrument-specific Level-1 and select L-2 visualization and data formatting tools	Have completed a beta version of an HDF-EOS to Geo-tiff converter. Are working with the GSFC Ocean, Land and Atmosphere group for output validation

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# DB Tool Development and Algorithms - FY06 Results - (cont.)



<u>Supported</u> <u>By:</u>	<u>Tool/Algorithm</u>	<u>Status</u>
<i>NPP/DRP</i> •	<b>Public Release and Tech Transfer</b>	Preparing submission of Disclosure of Innovation and Invention forms for NCS, DSM & RT-STPS. Have provided a web-based system for the distribution of EOS Institutional algorithms to the GSFC Land group.
<i>DRP</i>	• <b>Science Processing Algorithm Wrapper (SPA Wrapper)</b>	Have completed a proof-of-concept version using the VIIRS cloud mask algorithm. Have completed a JAVA version for legacy SPAs and for future IDPS SPAs
<i>DRP</i>	• <b>Direct Readout Web Portal, maintaining algorithm staging and DB user list, user questions on science algorithms &amp; tools</b>	Are updating technology development section. Have provided documentation updates to releasable software tools. Have staged NPP S/C to Ground RF ICD & the NPP Mission to DB Users Interface
<i>DRP</i>	• <b>NEpster</b>	On-hold



## Direct Readout Portal Software Downloads in 2006



<u>Tool/Algorithm</u>	<u>Number of Downloads</u>
• RT-STPS	168
• GBAD	60
• Simulcast	234
• Sorcerer	29
• MODIS Band Extractor	61
• Construction Record Lister	41
• MODIS Band Viewer	31
• MODIS DB Fire (MOD14)	79
• GSFC DAAC MODIS Level 1	65
• MODIS DB NDVI	107

*There are 1580 registered users on the NASA DR Portal*



# TERRA/AQUA Direct Readout Sites

